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# EXAMINATION OF BOGUS AND SUPPORTED OBSERVATIONAL DATA IN THE OPERATIONAL SUITE

## RE: CHANGE IN DECEMBER 1992 TO INCREASE BACKGROUND ERRORS IN THE VICINITY OF THESE DATA

BY SIMON WATERS

CENTRAL FORECASTING DIVISION

MAY 1994

TECH NOTE CF 18

Headquarters, Bracknell

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This paper has not been published. Permission to quote from it should be obtained from the Assistant Director of the above Meteorological Office Division.

## Examination of 'bogus' and 'supported' observation.

## Re: Change December 1992

### Introduction

At the beginning of December 1992, a change was made to the observation processing system to increase the model background errors near supported observations, and bogus observations. This should increase the weight associated with these observations in the assimilation scheme.

The OPD monthly archive were examined for statistical impact of this change.

### Method and Results

Bogus observations were treated only in terms of the type of observable measured (Wind U and V, Temperature and Humidity), rather than the bogusing method (Single or Multilevel) .

Only the supporting of aircraft data was examined when looking at supported observations.

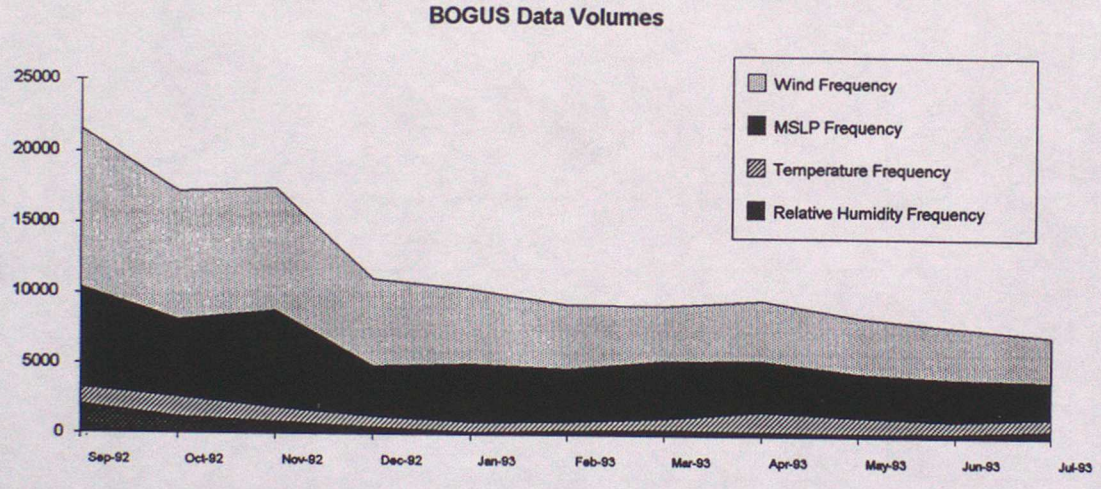


Figure 1. Volumes of Bogus Observation in the OPD.

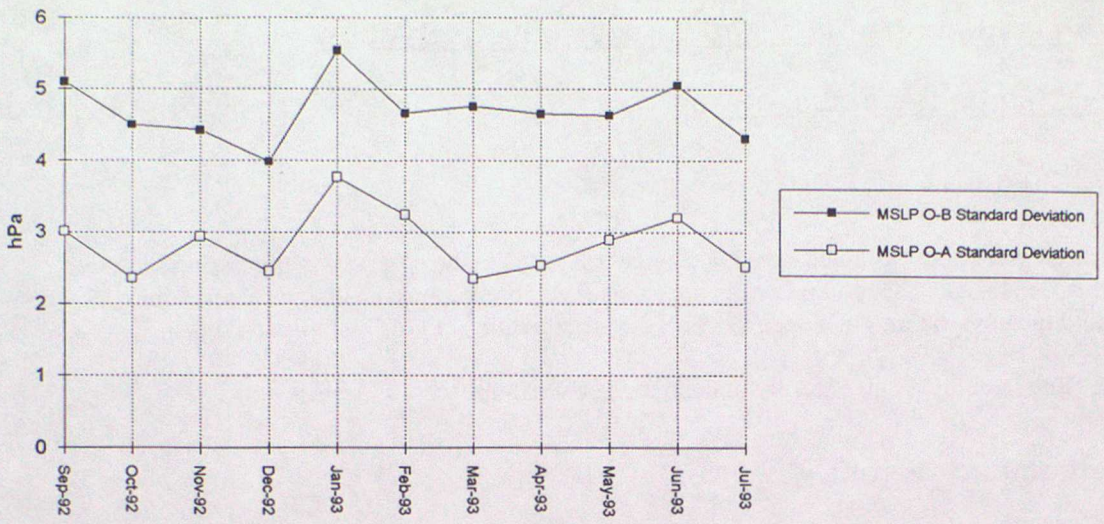


Figure 2. Time series showing standard deviation of BOGUS MSLP observation against global model background and analysises.

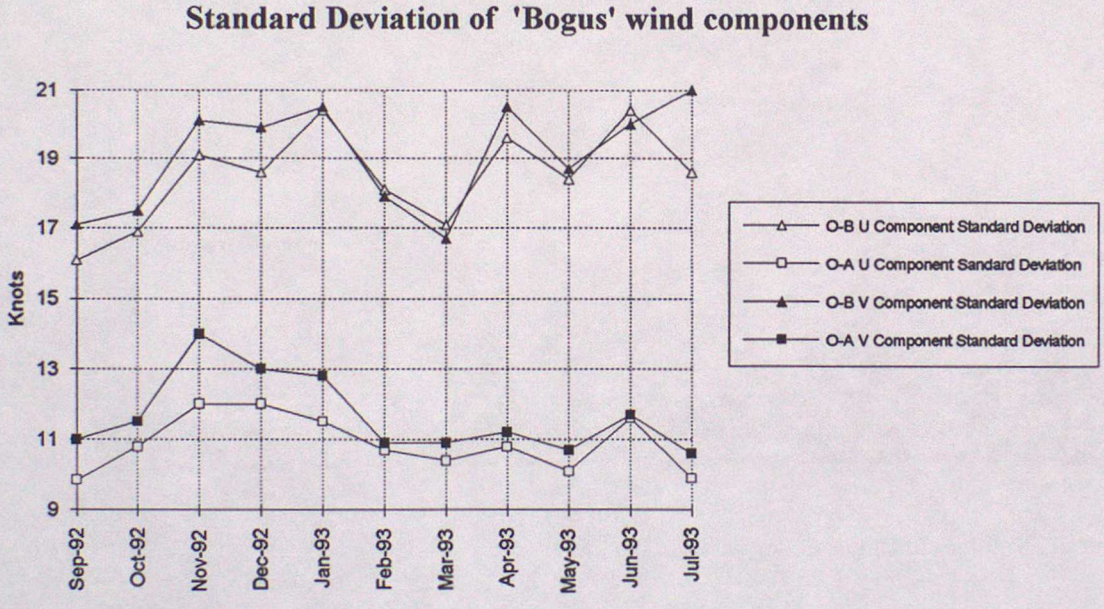


Figure 3. Similar to figure 2 but for U and V Component of BOGUS Wind Observations.

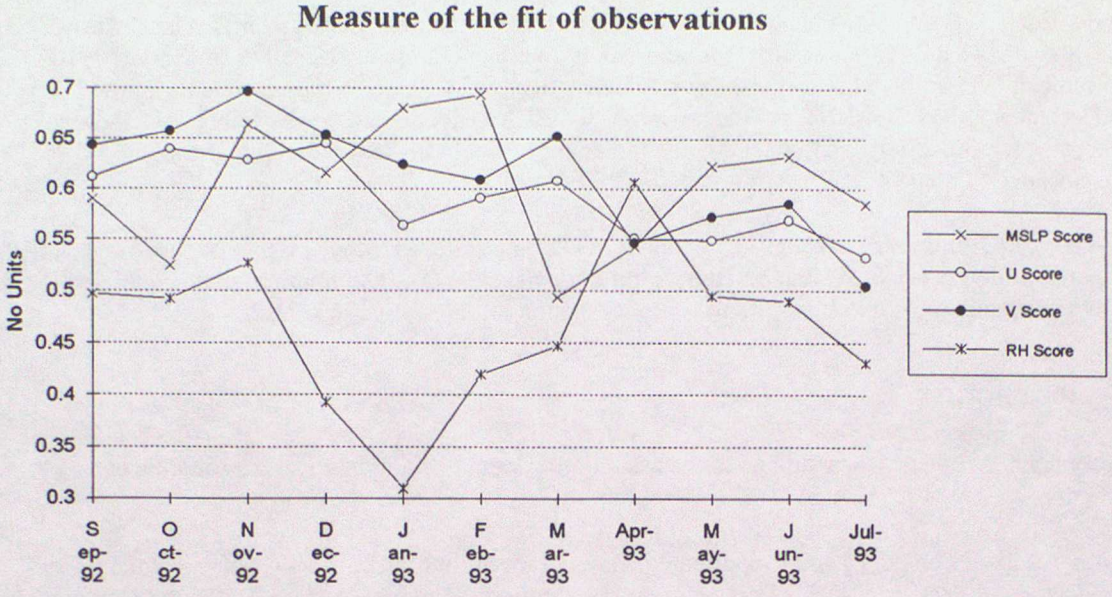


Figure 4. Time series of the ratio of the Standard deviation against analysis compared to the standard deviation against background.

Table 1. Fit of supported Aircraft Winds and Temperatures from the Global Unified Model. Only data passing quality control were used. ( 'DB' refers to difference from background, 'DA' to difference from analysis). All values are in Knots.

| DATE | Variable | N | Mean | Std Dev | Minimum | Maximum |
|---|---|---|---|---|---|---|
| NOV1992 | U_DB | 8035 | 10.0 | 20.5 | -65.6 | 79.6 |
| | U_DA | 8035 | 6.2 | 15.3 | -55.8 | 58.5 |
| DEC1992 | U_DB | 8748 | 11.8 | 20.0 | -86.3 | 103.3 |
| | U_DA | 8748 | 7.0 | 14.5 | -94.6 | 71.4 |
| **DATE** | **Variable** | **N** | **Mean** | **Std Dev** | **Minimum** | **Maximum** |
| NOV1992 | T_DB | 726 | -0.4 | 3.4 | -10.9 | 9.7 |
| | T_DA | 726 | -0.5 | 2.9 | -10.2 | 8.3 |
| DEC1992 | T_DB | 305 | -0.1 | 4.9 | -8.8 | 8.4 |
| | T_DA | 305 | -0.1 | 3.9 | -7.9 | 8.7 |

## Analysis of Results

### Bogus data

Figure 1 shows a large decrease in the number of bogus wind and pressure observations in December 1992 compared to November 1992. This change in data quantity remains unexplained. However this makes a statistical comparision unlikely to give meaningful results.

The results for relative humidity are based on small monthly samples. Whilst the variation in fit of relative humidity (Fig 4) is interesting, FR plan to introduce changes in the use of temperatures in the assimilation (to preserve Relative Humidity). Preliminary results suggest this has a more significant impact on relative humidity during the assimilation, so further investigation may not be warranted.

The fitting of bogus wind data (especially the V Component) appears to have improved (In figure 4), from April 1993, however this appears to be related to an increase in the standard deviation of the O-B components rather than through a closer fit to analysis.

### Supported Data

Table 1 details U component and Temperature details for supported aircraft reports. The key features are that bogus data was better fitted for both winds and temperature in December compared to November. Whilst there seems to be some evidence that the supported temperature data is fitted better in December (RMS O-A/RMS O-B temperature scores of 0.92 and 0.82 for November and December respectively), the difference in data quality and quantity would make it difficult to draw any conclusions.

The large O-A minimum for the U component in December suggests the presence of supported data at variance with other data available to the assimilation (Table 1 O-A Minimum of -94.6 compared to O-B Minimum of -86.3), however no further investigation of this 'outlier' was made.

## Conclusions

The amount of bogus data available to the assimilation went down dramatically during the period examined.

Further statistics on bogus and supported data are not useful in drawing conclusions, and the impact of a change like this is probably best examined by comparing the runs with and without the change.